Appendix D1

Onroad Sources

MOBILE EMISSIONS INPUT DEVELOPMENT

TECHNICAL DOCUMENTATION

LIST OF REFERENCES

1. VinPOWER, Copyright: ESP Data Solutions Inc., Product version 4.0.0.16

2. RegistrationDistributionConverter_Veh16
   http://www.epa.gov/oms/models/moves/tools.htm

3. AAD VMT Calculator HPMS.XLS
   http://www.epa.gov/oms/models/moves/tools.htm

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BACKGROUND

This technical report documents how the various input categories needed for successful MOVES model runs were developed. It covers the development of both travel-related inputs, which are based on the MWCOG/TPB regional travel demand model (Version 2.3. 52), and non-travel related inputs (i.e., meteorology, fuel supply and formulation, and Inspection/Maintenance Programs), which were provided by agencies from the District of Columbia, the Commonwealth of Virginia, and the state of Maryland. These inputs are being provided in Appendix D2 (MOVES2010a county input databases).

INPUT DATA DEVELOPMENT

Input data from ten broad categories were used in the MOVES County Manager in order to generate the mobile emissions inventories. The modeling sequence that was followed is graphically illustrated in Figure 1.

Input data categories
(for County Data Manager)

1. Age Distribution
2. Average Speed Distribution
3. Road Type Distribution
4. Source Type Population
5. Vehicle Type VMT
6. Ramp Fraction
7. Fuel Formulation
8. Fuel Supply
9. I/M Programs
10. Meteorology Data

Jurisdictional level
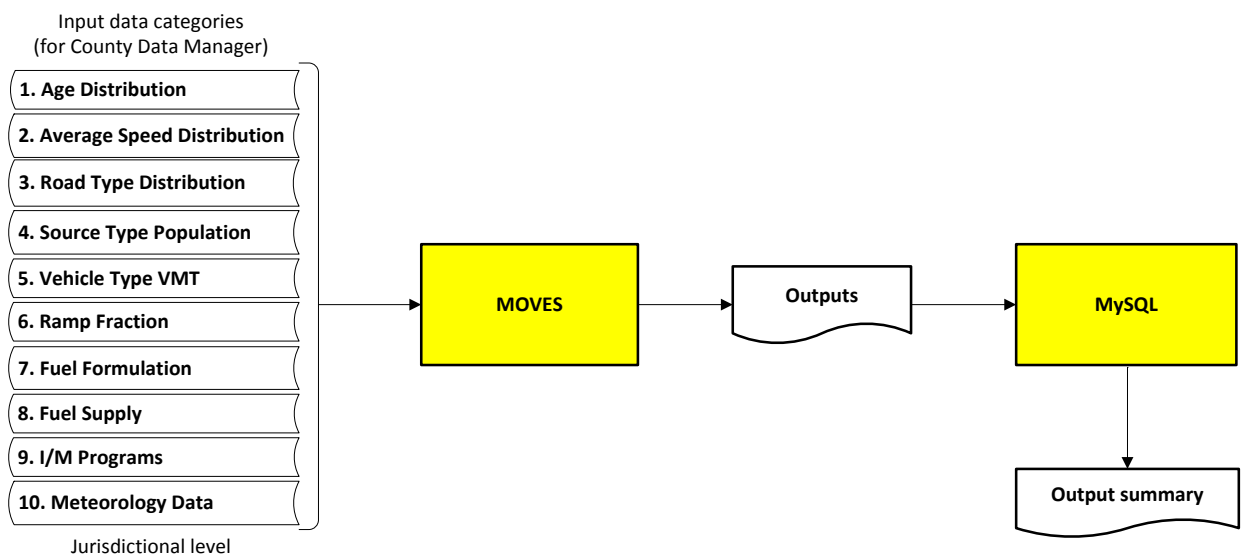
MOVES → Outputs → MySQL → Output summary

Figure 1– MOVES Modeling Process

Input data were obtained from a variety of sources (Table 1). Special emphasis was placed on the inclusion of local data – where available – instead of MOVES default values, which were derived from national data as opposed to regional/local data.

No	Data Category	Data Table Name	Locality	Methodology
1	Age Distribution	**sourceTypeAgeDistribution**	County	based on VIN
2	Average Speed Distribution	**avgSpeedDistribution**	County	based on travel demand model's post-processor outputs + school bus/refuse truck data from Fairfax Co. + transit bus from WMATA
3	Road Type Distribution	**roadTypeDistribution**	County	based on travel demand model's post-processor outputs
4	Source Type Population	**sourceTypeYear**	County	based on CLRP Vehicle Projection & VIN
5	Vehicle Type VMT	**HPMSVTypeYear**	County	based on TDM's post-processor outputs
		monthVMTFraction	Region	based on Regional Data
		dayVMTFraction	Region	based on Regional Data
		hourVMTFraction	Region	based on Regional Data
6	Ramp Fraction	**roadType**	Region	8% of the urban/rural restricted access roads
7	Fuel	**FuelSupply**	State	from state air agency (state-wide data)
8		**FuelFormulation**	State	from state air agency (state-wide data)
9	I/M Programs	**IMCoverage**	State	from state air agency (state-wide data)
10	Meteorology Data	**zoneMonthHour**	State	from DEP (region-wide data)

Table 1– MOVES Input Categories

AGE DISTRIBUTION

On a triennial basis since 2005, the Departments of Motor Vehicles (DMV) of the District of Columbia, Maryland and Virginia supplied MWCOG/TPB vehicle registration data for use in Air Quality Conformity Determinations. These databases contain a broad range of attributes of the vehicles registered in the Washington region.

Prior to being used as inputs in MOVES model runs, the "raw" vehicle registration data – also known as Vehicle Identification Numbers (VIN) – were decoded using a commercial decoding software program [1]. Due to the structure of the decoding software program, the VIN database decoding was achieved in two steps: (1) the "raw" data was decoded to a Mobile 6.2-compatible format (vehicle populations distributions stratified in 16 vehicle classes and in 25 vehicle age categories); and (2) the Mobile 6.2-compatible vehicle population distributions were converted to a MOVES-compatible format (vehicle population distributions stratified in 13 vehicle classes and in 31 vehicle age categories) using an EPA-developed converter [2] while following the process recommended by EPA. The vehicle population mapping process is shown in greater detail in Table A1 in the Attachment of this report.

The vehicle population databases were reviewed by the MWCOG/TPB technical oversight committees and went through public comments prior to becoming approved for transportation planning applications. The 2011 VIN database was formally approved by MWCOG/TPB concurrently with the 2012 CLRP Air Quality Conformity Determination (July 2012). Such data was originally provided by the state agencies of the District of Columbia, the Commonwealth of Virginia and the state of Maryland in Mobile 6.2-format for use in Air Quality Conformity Determination analyses. This data was also converted to MOVES-compatible format for inclusion in MOVES model runs. Base year 2011 emissions inventories were based on the 2011 VIN.

AVERAGE SPEED DISTRIBUTION

The MWCOG/TPB regional travel demand model derives travel-related outputs – such as VHT -- used for Air Quality Conformity by six travel markets:

1. Light Duty Vehicles/Single Occupancy Vehicles (SOV)
2. Light Duty Vehicles/High Occupancy Vehicles (HOV2)
3. Light Duty Vehicles/High Occupancy Vehicles (HOV3+)
4. Airport Passenger Trips
5. Commercial Vehicles
6. Trucks

A custom post processor (i.e., the V2.3 Post Processor) was developed in order to account for Vehicle Hours of Travel (VHT) stratified by three major vehicle type categories: passenger vehicles, commercial vehicles and heavy duty vehicles. The conversion of the VHT totals by the six travel markets to VHT totals by the three major vehicle type categories was done as follows:

- Passenger Vehicles (PVs) = SOV + HOV2 + HOV3+ + Airport Passenger Trips
- Commercial Vehicles (CVs) = Commercial Vehicles
- Heavy Duty Vehicles (HDVs) = Trucks

For each of the three major vehicle type categories, hourly VHT distributions were derived by MOVES-compatible speed bins, by jurisdiction (i.e., county), and road type. MOVES calls for 16 speed bins along a continuous spectrum of speeds ranging from a low value of 2.5 mph to a high value of 75 mph in increments of 5 mph. MOVES also calls for four road types: restricted access facilities (i.e., freeways and expressways) in urban and rural settings and unrestricted access facilities (i.e., major/minor arterials, collectors and local roads) in urban and rural settings. Average Speed Distribution by the 16 MOVES-compatible speed bins was achieved as follows:

VHT Distribution to Restricted Facilities (all vehicle type categories):

- Weekday VHT Distribution:
  - All Day: Hourly distribution for all vehicles (as derived from the V2.3 Post Processor)
- Weekend VHT Distribution:
  - 11:00 am – 7:00 pm: Distribution across the 13 MOVES-compatible vehicle type categories reflecting the 3:00 pm hour on a weekday (as derived from the V2.3 Post Processor)
  - 7:01 pm – 10:59 am: Distribution across the 13 MOVES-compatible vehicle type categories reflecting the 12:00 am hour on a weekday (as derived from the V2.3 Post Processor)

VHT Distribution to Unrestricted Facilities (all vehicle type categories plus Intercity Bus). Refuse Trucks, School Buses and Transit Buses were accounted separately in a section that follows.
- Weekday VHT Distribution:
  - All Day: : Hourly distribution for all vehicles (as derived from the V2.3 Post Processor)

- Weekend VHT Distribution:
  - 11:00 am – 7:00 pm: Distribution across the 13 MOVES-compatible vehicle type categories reflecting the 3:00 pm hour on a weekday (as derived from the V2.3 Post Processor)
  - 7:01 pm – 10:59 am: Distribution across the 13 MOVES-compatible vehicle type categories reflecting the 12:00 am hour on a weekday (as derived from the V2.3 Post Processor)

VHT Distribution to Unrestricted Facilities of Refuse Trucks:
Refuse Trucks operate on a 3-phase cycle: Phase 1 is the period of driving from the dispatch garage to trash collection sites; Phase 2 is the period of the actual trash/recycle collection; Phase 3 is the period of driving back to transfer stations. Based on the local data provided by Fairfax County, VA, the average speed of Phase 1 and Phase 3 is within the MOVES Speed Bin 6 range, and the average speed of Phase 2 is within the MOVES Speed Bin 2.

Weekday VHT Distribution (Table 2):
- 5:00 am–5:00 pm (Trash Collection): VHT hourly distribution consists of Phases 1, 2 and 3.
- 5:00 pm–5:00 am (On Road Phase): VHT hourly distribution consists of Phase 2.

Speed Bins	Speed Range	5:00 AM - 5:00 PM	5:01 PM - 4:59 AM
1	speed < 2.5mph	0.00%	0.00%
2	2.5mph <= speed < 7.5mph	62.65%	0.00%
3	7.5mph <= speed < 12.5mph	0.00%	0.00%
4	12.5mph <= speed < 17.5mph	0.00%	0.00%
5	17.5mph <= speed <22.5mph	0.00%	0.00%
6	22.5mph <= speed < 27.5mph	37.35%	100.00%
7	27.5mph <= speed < 32.5mph	0.00%	0.00%
8	32.5mph <= speed < 37.5mph	0.00%	0.00%
9	37.5mph <= speed < 42.5mph	0.00%	0.00%
10	42.5mph <= speed < 47.5mph	0.00%	0.00%
11	47.5mph <= speed < 52.5mph	0.00%	0.00%
12	52.5mph <= speed < 57.5mph	0.00%	0.00%
13	57.5mph <= speed < 62.5mph	0.00%	0.00%
14	62.5mph <= speed < 67.5mph	0.00%	0.00%
15	67.5mph <= speed < 72.5mph	0.00%	0.00%
16	72.5mph <= speed	0.00%	0.00%

Source: Fairfax Co., VA

Table 2– VHT Distribution for Refuse Trucks (Average Weekday)

Weekend VHT Distribution:
- All Day: VHT distribution made up of Phase 1 and Phase 3 (on road phases)

VHT Distribution to Unrestricted Facilities of School Buses:
Weekday VHT Distribution:
- 6:00 am–6:00 pm: VHT distribution from Fairfax County, VA school bus speed data. (Table 3)
- 6:00 pm–6:00 am: VHT distribution of heavy duty vehicles (as derived from the V2.3 Post Processor)

Weekend VHT Distribution:
- 11:00 am–7:00 pm: VHT Distribution of heavy duty vehicles at 3:00 pm on a weekday (as derived from the V2.3 Post Processor)
- 7:00 pm – 11:00 am: VHT Distribution of heavy duty vehicles at 12:00 am on a weekday (as derived from the V2.3 Post Processor)

VHT Distribution to Unrestricted Facilities of Transit Buses
Weekday VHT Distribution (Table 4):
- 6:00 am–9:00 am: VHT distribution from WMATA's transit bus speed data of AM peak period
- 9:00 am–3:00 pm: VHT distribution from WMATA's transit bus speed data of off-peak period
- 3:00 pm – 6:00 pm: VHT distribution from WMATA's transit bus speed data of PM peak period
- 6:00pm-6:00 am: VHT distribution from WMATA's transit bus speed data of off-peak period

Weekend VHT Distribution (Table 4):
- All Day: VHT distribution from WMATA's transit bus speed data of off-peak period.

ROAD TYPE DISTRIBUTION

The Version 2.3 Post Processor accounts for VMT by three vehicle types: passenger vehicles, commercial vehicles and heavy duty vehicles. In the MOVES environment, 13 vehicle type categories are identified. The challenge was to "expand" the VMT allocations (as percentages of the total) from the three vehicle type categories to the 13 MOVES-compatible vehicle type categories. The Version 2.3 Post Processor also accounts for VMT by two facility types: restricted access facilities (i.e., freeways and expressways), and unrestricted access facilities (i.e., major/minor arterials, collectors and local roads). The VMT allocated to each of the three vehicle type categories is also stratified by the two facility types.

The VMT distribution by Vehicle Class Type and Facility Type was done as follows:

- Passenger Vehicles (PVs) VMT percentages (by facility type): From the V2.3 Post Processor applied to motorcycles, passenger cars and passenger trucks
- Commercial Vehicles (CVs) VMT percentages (by facility type): From the V2.3 Post Processor applied to light commercial trucks
- Heavy Duty Vehicles (HDVs) VMT percentages (by facility type): From the V2.3 Post Processor applied to single unit short haul and long haul trucks, and combination short and long haul trucks
- Refuse Trucks and Motor Homes: MOVES default percent value
- Local network VMT percentages – based on local data supplied by bus operators – were applied to school, transit and intercity buses

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Speed Bins	Speed Range	Bus Trip 1	Bus Trip 2	Bus Trip 3	Bus Trip 4	Bus Trip 5	Bus Trip 6	Bus Trip 7	Bus Trip 8	Bus Trip 9	Bus Trip 10	Bus Trip 11	Weighted Average
1	speed < 2.5mph	35.20%	24.30%	17.58%	14.65%	7.90%	16.11%	6.65%	18.30%	25.76%	16.18%	17.67%	**19.21%**
2	2.5mph <= speed < 7.5mph	10.87%	11.57%	6.45%	11.04%	29.89%	20.20%	44.83%	11.01%	9.68%	6.49%	9.12%	**14.39%**
3	7.5mph <= speed < 12.5mph	10.90%	9.35%	12.89%	6.50%	26.31%	17.69%	3.34%	9.12%	9.52%	6.69%	8.69%	**10.92%**
4	12.5mph <= speed < 17.5mph	8.81%	9.18%	8.59%	9.45%	6.00%	11.13%	23.76%	10.12%	9.98%	8.46%	10.32%	**10.37%**
5	17.5mph <= speed <22.5mph	5.01%	10.15%	5.18%	14.04%	3.04%	5.94%	4.09%	10.36%	7.57%	9.74%	12.02%	**8.30%**
6	22.5mph <= speed < 27.5mph	8.91%	8.55%	11.62%	12.59%	6.18%	5.30%	3.54%	7.29%	7.11%	8.87%	11.73%	**8.13%**
7	27.5mph <= speed < 32.5mph	8.79%	7.97%	14.36%	11.28%	5.86%	13.33%	6.35%	9.43%	5.37%	10.06%	10.20%	**9.41%**
8	32.5mph <= speed < 37.5mph	5.33%	9.10%	5.86%	13.43%	7.62%	3.32%	6.36%	13.79%	8.68%	12.04%	6.81%	**7.81%**
9	37.5mph <= speed < 42.5mph	3.43%	6.89%	8.69%	7.02%	4.80%	3.76%	1.07%	7.94%	9.79%	13.81%	8.16%	**7.22%**
10	42.5mph <= speed < 47.5mph	1.72%	2.44%	8.79%	0.00%	2.40%	2.87%	0.00%	1.31%	5.83%	5.15%	4.75%	**3.42%**
11	47.5mph <= speed < 52.5mph	0.68%	0.00%	0.00%	0.00%	0.00%	0.36%	0.00%	0.67%	0.31%	2.27%	0.36%	**0.59%**
12	52.5mph <= speed < 57.5mph	0.34%	0.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.67%	0.41%	0.24%	0.18%	**0.23%**
13	57.5mph <= speed < 62.5mph	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
14	62.5mph <= speed < 67.5mph	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
15	67.5mph <= speed < 72.5mph	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**
16	72.5mph <= speed	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.00%**

Source: Fairfax Co., VA

Table 3– VHT Distribution of School Buses (6:00 am – 6:00 pm)

avgSpeedBinID	avgBinSpeed	avgSpeedBinDesc	6:00AM-9:00AM	3:00PM-6:00PM	9:01AM-2:59PM/6:01PM-5:59AM
1	2.5	speed < 2.5mph	9.94%	9.10%	7.92%
2	5	2.5mph <= speed < 7.5mph	13.79%	18.95%	14.49%
3	10	7.5mph <= speed < 12.5mph	34.07%	37.86%	31.36%
4	15	12.5mph <= speed < 17.5mph	28.52%	23.97%	29.17%
5	20	17.5mph <= speed <22.5mph	10.02%	5.92%	10.77%
6	25	22.5mph <= speed < 27.5mph	1.88%	1.84%	3.91%
7	30	27.5mph <= speed < 32.5mph	0.92%	0.85%	1.04%
8	35	32.5mph <= speed < 37.5mph	0.34%	0.60%	0.72%
9	40	37.5mph <= speed < 42.5mph	0.14%	0.50%	0.35%
10	45	42.5mph <= speed < 47.5mph	0.05%	0.15%	0.15%
11	50	47.5mph <= speed < 52.5mph	0.31%	0.28%	0.06%
12	55	52.5mph <= speed < 57.5mph	0.00%	0.00%	0.06%
13	60	57.5mph <= speed < 62.5mph	0.00%	0.00%	0.00%
14	65	62.5mph <= speed < 67.5mph	0.00%	0.00%	0.00%
15	70	67.5mph <= speed < 72.5mph	0.00%	0.00%	0.00%
16	75	72.5mph <= speed	0.00%	0.00%	0.00%

Source: Washington Metropolitan Area Transit Authority (WMATA)

Table 4– VHT Distribution of Transit Buses

Urban versus rural percentage split factors were subsequently applied to differentiate VMT allocations between urban and rural facilities. These factors varied by jurisdiction as they were based on the latest Highway Performance Monitoring System (HPMS) VMT data provided by the three state transportation agencies. Figure 2 graphically illustrates the process that was followed to allocated VMT percentages by vehicle type class and road type in a format that is MOVES-compatible.
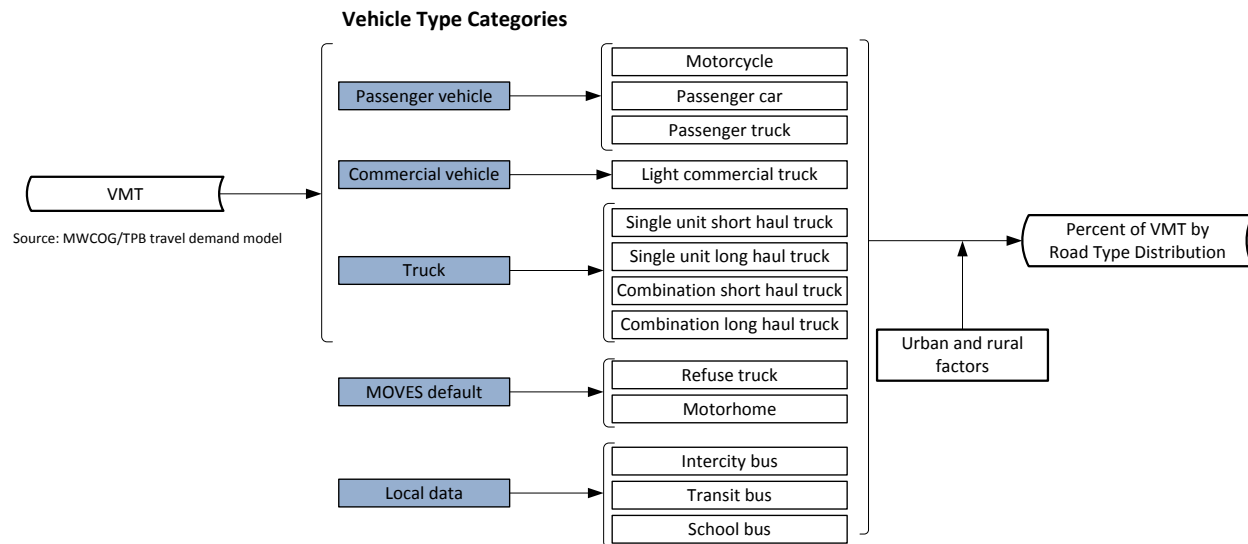

Figure 2– VMT Distribution Development Process

SOURCE TYPE POPULATION

The 2011 VIN profile was used for the base year 2011 analysis.

Each vehicle population profile reflects an actual (and unique) composition of the regional vehicle fleet at a given point in time. The "raw" 2011 VIN data was decoded using a commercial decoding software program. Since the "raw" data were a 100-percent sample of the registered vehicles in the non-attainment area no further data expansion was needed.

The vehicle population distributions – composition and age -- were converted to a MOVES-compatible format (i.e., 13 MOVES vehicle types) using the standard EPA-developed vehicle population mapping table (Table A1 in the Appendix section of this report).

VEHICLE TYPE VMT

MOVES requires annual VMT by six Highway Performance Monitoring System (HPMS) vehicle types instead of the 13 MOVES vehicle types. The V2.3 Post Processor produces average annual weekday VMT estimates by three vehicle types: passenger vehicles, commercial vehicles and heavy duty vehicles. Based

on the VMT percent by 13 HPMS vehicle types and the vehicle registration data, average annual weekday VMT in three vehicle types from the V2.3 post processor and the local bus, VMT estimates are split into six HPMS vehicle types.

The average annual weekday VMT by six HPMS vehicle types is then fed into the EPA-provided annual VMT converter (AAD VMT Calculator HPMS.XLS) [3] with local monthly adjustment factors and weekend-day adjustment factors. The converter develops annual VMT in six HPMS vehicle types required as an input to MOVES with two additional outputs (i.e., 'monthVMTfraction' and 'dayVMTfraction'). The local "hourlyVMTfraction" is also provided as part of the annual VMT input.

RAMP FRACTION

Local data was used to estimate the local ramp fraction using a method approved by the MOVES Task Force. The locally-derived percentage is equal to 8 percent of VHT, the same as the MOVES default value.

METEOROLOGY

Meteorology data used in the base year 2011 onroad mobile emissions analysis were developed using the monthly average hourly data for 2011 for the Dulles and Reagan National airports. Temperature and dew point temperature data were averaged for each hour in each month to develop a single set of these two parameters for the Washington, DC-VA-MD ozone nonattainment region. Then hourly relative humidity data for each month were developed using the above two parameters. In this way, a regional set of hourly temperature and relative humidity data were developed for the period January through December for 2011, which were used in the MOVES2010a analysis for all counties in the nonattainment region.

While the annual emissions analysis used meteorology data for the period January through December for 2011, the ozone season day analysis only used data for July.

FUEL SUPPLY & FORMULATION

The District of Columbia, Maryland, and Virginia provided fuel characteristics data in the MOVES-ready format.

INSPECTION/MAINTENANCE (I/M) PROGRAMS

The District of Columbia, Maryland, and Virginia provided details of I/M programs in the MOVES-ready format.

STATE SPECIFIC CONTROL PROGRAMS

1. Early NLEV: The District of Columbia, Maryland, and Virginia adopted an Early NLEV program, which is reflected in the base year 2011 emission analysis.

2. <u>Stage II:</u> Varies by area as follows:
   - <u>District of Columbia:</u> Refueling vapor program adjustment- 0.9, Refueling spill program adjustment- 0.5 (MOVES2010a defaults)

   - <u>Maryland:</u> Refueling vapor program adjustment- 0.7, Refueling spill program adjustment- 0.7 (MOVES2010a Stage II database file - md_stageii)

   - <u>Virginia:</u>
     Refueling vapor program adjustment- 0.56, Refueling spill program adjustment- 0.56 (MOVES2010a Stage II database file - va_stage2_input_update2013feb)

3. <u>CAL-LEV II/ZEV Programs:</u> Since 2011 Maryland adopted CAL-LEV II program and as such it is reflected in the base year 2011 emission analysis. The following auxiliary files, provided by the Maryland Department of the Environment (MDE), were used to model these programs in the Maryland jurisdictions:
   MOVES2010a Cal-Lev II Database file - md_levii;
   MOVES2010a ZEV MS-Excel file - ZEV_AVFT_MD_2010a.xls

Attachment

TABLE A1 - Population Mapping from MOBILE6.2 Vehicle Types to MOVES Source Types

| MOBILE6.2 Vehicle | | MOVES Source Type | | |
ID	Name	ID	Name	Fraction
1	LDGV	21	Passenger Car	1.00
2	LDGT1	31	Passenger Truck	0.78
		32	Light Commercial Truck	0.22
3	LDGT2	31	Passenger Truck	0.78
		32	Light Commercial Truck	0.22
4	LDGT3	31	Passenger Truck	0.78
		32	Light Commercial Truck	0.22
5	LDGT4	31	Passenger Truck	0.78
		32	Light Commercial Truck	0.22
6	HDGV2B	31	Passenger Truck	0.63
		32	Light Commercial Truck	0.37
7	HDGV3	31	Passenger Truck	0.63
		32	Light Commercial Truck	0.37
8	HDGV4	31	Passenger Truck	0.06
		32	Light Commercial Truck	0.94
9	HDGV5	31	Passenger Truck	0.06
		32	Light Commercial Truck	0.94
10	HDGV6	43	School Bus	0.04
		52	Single Unit Short-haul Truck	0.69
		53	Single Unit Long-haul Truck	0.03
		54	Motor Home	0.23
		61	Combination Short-haul Truck	0.01
11	HDGV7	43	School Bus	0.04
		52	Single Unit Short-haul Truck	0.69
		53	Single Unit Long-haul Truck	0.03
		54	Motor Home	0.23
		61	Combination Short-haul Truck	0.01
12	HDGV8A	52	Single Unit Short-haul Truck	0.90
		53	Single Unit Long-haul Truck	0.08
		61	Combination Short-haul Truck	0.02
13	HDGV8B	52	Single Unit Short-haul Truck	0.90
		53	Single Unit Long-haul Truck	0.08
		61	Combination Short-haul Truck	0.02
14	LDDV	21	Passenger Car	1.00

TABLE A1 - Population Mapping from MOBILE6.2 Vehicle Types to MOVES Source Types (continues)

MOBILE6.2 Vehicle Type		MOVES Source Type		
ID	Name	ID	Name	Fraction
15	LDDT12	31	Passenger Truck	0.42
		32	Light Commercial Truck	0.58
16	HDDV2B	31	Passenger Truck	0.43
		32	Light Commercial Truck	0.57
17	HDDV3	31	Passenger Truck	0.43
		32	Light Commercial Truck	0.57
18	HDDV4	31	Passenger Truck	0.10
		32	Light Commercial Truck	0.90
19	HDDV5	31	Passenger Truck	0.10
		32	Light Commercial Truck	0.90
20	HDDV6	51	Refuse Truck	0.01
		52	Single Unit Short-haul Truck	0.72
		53	Single Unit Long-haul Truck	0.06
		54	Motor Home	0.07
		61	Combination Short-haul Truck	0.11
		62	Combination Long-haul Truck	0.03
21	HDDV7	51	Refuse Truck	0.01
		52	Single Unit Short-haul Truck	0.72
		53	Single Unit Long-haul Truck	0.06
		54	Motor Home	0.07
		61	Combination Short-haul Truck	0.11
		62	Combination Long-haul Truck	0.03
22	HDDV8A	51	Refuse Truck	0.02
		52	Single Unit Short-haul Truck	0.30
		53	Single Unit Long-haul Truck	0.02
		61	Combination Short-haul Truck	0.35
		62	Combination Long-haul Truck	0.31
23	HDDV8B	51	Refuse Truck	0.02
		52	Single Unit Short-haul Truck	0.30
		53	Single Unit Long-haul Truck	0.02
		61	Combination Short-haul Truck	0.35
		62	Combination Long-haul Truck	0.31
24	MC	11	Motorcycle	1.00
25	HDGB	43	School Bus	1.00
26	HDDBT	41	Intercity Bus	0.62
		42	Transit Bus	0.38
27	HDDBS	43	School Bus	1.00
28	LDDT34	31	Passenger Truck	0.42
		32	Light Commercial Truck	0.58